AMENDMENTS TO CLAIMS

1. (Currently Amended) A method for use in a storage network, the storage network including at least one initiator, at least one storage device, and a storage switch having a linecard connected to the at least one initiator and the at least one storage device for communication with the at least one initiator and the at least one storage device, the method comprising:

providing, by the linecard of the storage switch, quality of service to the at least one initiator for accessing the at least one storage device in the storage network, wherein providing quality of service includes guaranteeing a minimum bandwidth to the at least one initiator to access the storage device by estimating an actual bandwidth utilized by the initiator, where the actual bandwidth is estimated by a number of requests per second times an average size of requests from the at least one initiator.

2. (Cancelled)

3. (Previously Amended) The method of claim 1, wherein the step of providing quality of service includes controlling the number of packets from the at least one initiator to the at least one storage device during a period of time.

4. (Previously Amended) The method of claim 1, wherein the step of providing quality of service includes controlling the number of requests from the at least one initiator to the at least one storage device.

5. (Previously Amended) The method of claim 1, wherein the step of providing quality of service includes adjusting a number of concurrent requests allowed to be sent by the at least one initiator.

6. (Currently Amended) The method of claim 1, wherein the step of ~~providing quality of service~~ guaranteeing a minimum bandwidth to the at least one initiator includes adjusting the number of requests allowed the at least one initiator to keep the bandwidth utilized by the at least one initiator within a specified range.

7. (Cancelled)

8. (Currently Amended) The method of claim ~~7~~ 6, further including:

guaranteeing up to a maximum bandwidth to the at least one initiator to access the at least one storage device; and

wherein adjusting the number of ~~concurrent~~ requests includes reducing the number of concurrent requests allowed by the at least one initiator when the actual bandwidth exceeds the maximum bandwidth.

9. (Previously Amended) A method for use in a storage network, the storage network including at least one initiator, at least one storage device, and at least one storage switch having a linecard, wherein the at least one initiator and the at least one storage device are both in communication with the linecard of the storage switch, the method comprising:

guaranteeing, by the linecard of the storage switch, a minimum bandwidth to the at least one initiator to access the at least one storage device in the storage network; and

estimating, by the linecard of the storage switch, an actual bandwidth utilized by the at least one initiator, where the actual bandwidth is estimated by a number of requests per second times an average size of requests from the at least one initiator.

10. (Previously Amended) The method of claim 9, further comprising:

adjusting a number of concurrent requests allowed to be sent by the at least one initiator.

11. (Previously Amended) The method of claim 10, wherein the step of adjusting includes: reducing the number of concurrent requests allowed to be sent by the at least one initiator.

12. (Previously Amended) The method of claim 10, wherein the step of adjusting includes:

increasing the number of concurrent requests allowed to be sent by the at least one initiator.

13. (Previously Amended) The method of claim 9, further including guaranteeing, by the storage switch up to a maximum bandwidth to the at least one initiator to access the storage device.

14. (Previously Amended) The method of claim 13, further including:

reducing the number of concurrent requests allowed by the at least one initiator when the actual bandwidth exceeds its maximum bandwidth.

15. (Previously Amended) The method of claim 9, wherein estimating the actual bandwidth includes determining if a buffer includes a number of packets beyond a specified threshold.

16. (Previously Amended) A method for use in a storage network, the storage network including a plurality of initiators, a plurality of targets, and a storage switch having a linecard for communicating with the at least one initiator and the at least one storage device, the method comprising:

guaranteeing, by the linecard of the storage switch, a respective minimum bandwidth for each of a plurality of connections, wherein each respective connection is a connection from a respective initiator to a respective target via the storage switch in the storage network;

monitoring, by the linecard of the storage switch, an actual bandwidth utilized by each initiator, where the actual bandwidth is estimated by a number of requests per second from the initiator times an average size of the requests from the initiator; and

determining if the actual bandwidth used by one initiator is excessive, and, if excessive, adjusting, by the linecard of the storage switch, a number of allowed concurrent requests for at least one initiator.

17. (Original) The method of claim 16, wherein monitoring the actual bandwidth includes determining if a buffer includes a number of packets beyond a specified threshold.

18. (Original) The method of claim 16, wherein adjusting a number of allowed concurrent requests includes reducing the number of allowed concurrent requests to the one initiator that is using excessive bandwidth.

19. (Original) The method of claim 18, wherein adjusting a number of allowed concurrent requests includes increasing the number of allowed concurrent requests to another initiator.

20. (Original) The method of claim 16, wherein the targets are virtual targets.

21. (Previously Amended) The method of claim 16, further including guaranteeing, by the storage switch, up to a respective maximum bandwidth for each of the plurality of connections, wherein determining if the actual bandwidth used by one initiator is excessive includes determining if the one initiator has exceeded its maximum bandwidth.

22. (Currently Amended) A method for use in a storage network, the storage network including at least one initiator, at least one storage device, and a storage switch having a linecard, wherein the at least one initiator and the at least one storage device

are both in communication with the linecard of the storage switch, the method comprising:

providing a connection from the at least one initiator to the at least one storage device via the linecard of the storage switch in the storage network; and

adjusting, by the linecard of the storage switch, the number of requests allowed the at least one initiator to keep the bandwidth utilized by the at least one initiator within a specified range, wherein the bandwidth is estimated by a number of requests per second from the at least one initiator times an average size of the requests from the at least one initiator.

23. (Cancelled)

24. (Previously Amended) The method of claim 22, wherein the number of requests allowed the at least one initiator is the number of concurrent requests allowed the at least one initiator.

25. (Currently Amended) A switch for use in a storage network, the switch having a linecard comprising:

a port to be coupled to an external device, wherein the external device includes at least one of an initiator and a storage device; and

a bandwidth controller, the bandwidth controller including a processor, a traffic manager, and a buffer, for controlling bandwidth through the port by controlling a number of requests per second times an average size of the requests.

26. (Cancelled)

27. (Previously Amended) The switch of claim 25, wherein the processor is a storage processor.

28. (Original) The switch of claim 25, wherein the port and the bandwidth controller are on one of a plurality of linecards in the switch, wherein each linecard includes a respective port and a respective bandwidth controller.

29. (Cancelled)

30. (Currently Amended) A switch having a linecard, the linecard including:

a storage processor, including a request controller that estimates bandwidth by a number of requests per second times an average size of the requests;

a traffic manager in communication with the storage processor;

a buffer in communication with the traffic manager;

wherein if a specified threshold in the buffer is reached, the traffic manager is designed to activate the request controller to control the bandwidth.

31. (Original) The switch of claim 30, wherein the request controller is designed to adjust the number of requests allowed an initiator to keep the bandwidth utilized by the initiator within a specified range.

32. (Cancelled)

33. (Currently Amended) A storage switch for use in a storage network, the storage switch having a linecard comprising:

a first port to be coupled to at least one initiator;

a second port to be coupled to at least one storage device; and

means for providing quality of service for a connection from the at least one initiator to the at least one storage device in the storage network, comprising:

means for guaranteeing a minimum bandwidth to at least one initiator to access a storage device; and

means for estimating an actual bandwidth utilized by the at least one initiator, where the actual bandwidth is estimated by the number of requests per second times the average size of the requests from the at least one initiator.

34. (Currently Amended) The switch of claim 33, wherein means for providing quality of service ~~includes~~ further comprises:

~~means for guaranteeing a minimum bandwidth to at least one initiator to access a storage device;~~

~~means for estimating an actual bandwidth utilized by the at least one initiator, where the actual bandwidth is estimated by the number of requests per second times the average size of the requests from the at least one initiator; and~~

means for adjusting the number of concurrent requests allowed to be sent by the at least one initiator to keep the bandwidth utilized by the at least one initiator within a specified range having as a lower limit the minimum bandwidth.

35. (Original) The switch of claim 33, wherein means for providing quality of service includes:

a processor;

a traffic manager; and

a buffer.

36. (Original) The switch of claim 35, wherein the processor is a storage processor.

37. (Previously Amended) A storage network, including:

an initiator;

a storage device;

a switch having a linecard in communication with the initiator and the storage device;

wherein the linecard of the switch includes a traffic manager in communication with a buffer;

wherein when the buffer includes a number of packets from the initiator that exceeds a specified threshold, then the switch is designed to notify the initiator to reduce a number of concurrent requests.

38. (Previously Amended) A machine readable media which has instructions stored thereon, which when executed on a linecard of a storage switch in a storage network including an initiator and a storage device in communication with the linecard of the storage switch causes the linecard of the storage switch to perform the following steps:

guaranteeing a minimum bandwidth to the initiator to access the storage device in the storage network; and

estimating an actual bandwidth utilized by the initiator, where the actual bandwidth is estimated by a number of requests per second times an average size of requests from the initiator.

39. (Original) The machine readable media of claim 38, further including instructions for performing the step of:

adjusting a number of concurrent requests allowed to be sent by the initiator.

40. (Original) The machine readable media of claim 39, wherein the step of adjusting includes:

reducing the number of concurrent requests allowed to be sent by the initiator.

41. (Original) The machine readable media of claim 39, wherein the step of adjusting includes:

increasing the number of concurrent requests allowed to be sent by the initiator.

42. (Previously Amended) The machine readable media of claim 38, further including instructions for performing the step of:

guaranteeing, by the linecard of the storage switch, up to a maximum bandwidth to the initiator to access the storage device.

43. (Original) The machine readable media of claim 42, further including instructions for performing the step of:

reducing the number of concurrent requests allowed by the initiator when it exceeds its maximum bandwidth.

44. (Previously Amended) The machine readable media of claim 38, wherein estimating the actual bandwidth includes determining if a buffer includes a number of packets beyond a specified threshold.